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DEPRESSIVE SYMPTOMS AND GLYCAEMIC CONTROL IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: A CROSS-SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL IN KOLKATA

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ABSTRACT

Background: Depression is a common psychological comorbidity in patients with type 2 diabetes mellitus (T2DM) and may adversely affect diabetes self-management and glycaemic control. This study assessed the occurrence of depressive symptoms among patients with T2DM and evaluated their association with glycaemic control and selected demographic and clinical factors.

Materials and Methods: A hospital-based, observational, descriptive, cross-sectional study was conducted among 178 patients with T2DM attending the Diabetic Clinic of Calcutta National Medical College and Hospital, West Bengal. Patients aged >18 years with T2DM for at least one year and receiving pharmacological treatment were included. Depressive symptoms were assessed using the Hamilton Depression Rating Scale. Glycaemic control was assessed using glycated haemoglobin (HbA1c), with HbA1c <7% considered good control and HbA1c ≥7% considered poor control. Associations were assessed using the chi-square test, followed by multivariable logistic regression. A p-value <0.05 was considered statistically significant.

Results: The mean age of participants was 43.5 ± 8.58 years, and 62.4% were male. Depressive symptoms were present in 63 (35.4%) participants; 48 (27.0%) had mild and 15 (8.4%) had moderate depression. Depression was significantly associated with gender (p<0.001), residence (p=0.003), religion (p=0.043), presence of comorbidities (p=0.039), duration of T2DM (p=0.027), and glycaemic control (p=0.047). Depression was present in 61.2% of participants with poor glycaemic control compared with 19.8% of those with good control. On multivariable analysis, male gender (adjusted odds ratio [AOR] 2.227; 95% confidence interval [CI]: 1.593–3.297; p=0.030), diabetes duration >10 years (AOR 4.870; 95% CI: 3.167–9.621; p=0.003), and poor glycaemic control (AOR 9.137; 95% CI: 5.663–17.528; p<0.001) remained significantly associated with depression.

Conclusion: Depressive symptoms were common among patients with T2DM and showed a strong association with poor glycaemic control and longer duration of diabetes. Routine recognition of depressive symptoms alongside metabolic assessment may help identify patients requiring additional psychological support. Prospective studies are needed to clarify the temporal relationship between depression and glycaemic control.

Keywords: Type 2 diabetes mellitus; Depression; Glycaemic control; Mental health; Hamilton Depression Rating Scale

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycaemia and is associated with substantial physical and psychological consequences. The long-term demands of diabetes management, together with its complications and effects on daily life, can adversely affect psychological well-being.[1] Depression is an important comorbidity in individuals with diabetes, and evidence suggests a bidirectional relationship between depression and diabetes.[2,3]

The presence of depression among individuals with T2DM has important implications for quality of life and daily functioning. Diabetes itself can interfere with routine activities, while the coexistence of mental disorders contributes further to disability and impaired quality of life.[4,7] Patients with T2DM and depressive symptoms have been reported to have poorer health-related quality of life compared with those without such psychological morbidity.[7]

The prevalence of depression among people with diabetes varies across different populations and healthcare settings. Studies included in the present literature base have reported depressive symptoms in approximately 31% of adults with diabetes in the United States, 19% of patients in rural Bangladesh and 29% of non-insulin-treated individuals with T2DM in Greece.[8–10] A large Spanish and Mexican cohort study also demonstrated a substantial burden of depression among patients with T2DM.[11,12] These differences may reflect variations in healthcare access, socioeconomic circumstances, cultural perceptions of mental health and approaches to diabetes management.

In India, depression is also frequently reported among individuals with T2DM. Studies have documented a considerable prevalence of depressive symptoms among Indian patients with diabetes, with estimates of approximately 38% and higher proportions reported in some populations.[13,14] Depression may adversely influence diabetes self-management, including adherence to medication, dietary practices, physical activity and follow-up, potentially contributing to suboptimal glycaemic control.[13,14]

The relationship between depression and glycaemic control is particularly relevant because psychological distress may influence behaviours important for diabetes management, while physiological changes associated with stress and depression may also contribute to impaired metabolic control. The literature cited in the study has demonstrated an association between depressive symptoms and higher glycated haemoglobin (HbA1c) levels.[2,3]

Evidence from Eastern India is also suggestive of a substantial burden of depression among patients with diabetes. A tertiary-care hospital study from Eastern India reported depressive symptoms in 39.5% of diabetic patients and identified several demographic and clinical factors associated with depression.[16] However, data specifically examining depression and its relationship with glycaemic control among patients with T2DM in tertiary-care settings in Kolkata remain limited.

Therefore, the present study was undertaken to assess the occurrence of depressive symptoms among patients with T2DM attending a tertiary-care hospital in Kolkata and to determine their association with glycaemic control.

MATERIALS AND METHODS

This observational, descriptive, cross-sectional study was conducted as an institutional-based study in the Diabetic Clinic of Calcutta National Medical College and Hospital, West Bengal. The study period was 24 months, commencing after obtaining clearance from the Institutional Ethics Committee and acceptance from the West Bengal University of Health Sciences. The study population comprised patients attending the diabetic clinic. Patients aged above 18 years who had been diagnosed with type 2 diabetes mellitus for at least one year and were receiving pharmacological therapy were eligible. Patients who were terminally ill, those with a previous diagnosis of major psychiatric illness such as bipolar disorder, schizophrenia or other mood disorders, and those unwilling to provide consent were excluded.

The required sample size was calculated using the formula $N = z^2pq/d^2$, where z represents the critical value corresponding to the 95% confidence level (1.96), p represents the expected prevalence based on previous research, $q = 1-p$, and d represents the margin of error. A prevalence of 37.5% based on previous research was considered. With p taken as 0.37, q as 0.63, z as 1.96 and d as 0.10, the calculated sample size was 89. Considering a design effect of 2, the final sample size was 178 participants. Systematic random sampling was used.

Data collection was planned over 36 weeks, with the diabetic clinic functioning once weekly on Fridays. Based on the required sample size, approximately five participants were recruited each week. Review of previous clinic records showed that approximately 58 patients diagnosed with diabetes for at least one year attended the clinic each week. Therefore, every 11th patient was selected for interview. The first participant was selected using the lottery method or random number generation. At each clinic visit, the outpatient register was reviewed and eligible patients were approached. After the study was explained, written informed consent was obtained. Face-to-face interviews were conducted while maintaining anonymity and confidentiality.

The study variables included socio-demographic characteristics such as age, sex, religion, occupation, residence, educational status, employment status, socioeconomic status, marital status and type of family. Dietary habits and addictions, including smoking, alcohol consumption and chewing tobacco, were recorded. Anthropometric variables included

height, weight and body mass index. Physical activity, comorbidities and disease-related characteristics were also documented. Disease profile variables included duration of type 2 diabetes mellitus, family history of diabetes, fasting blood sugar, postprandial blood sugar, glycated haemoglobin, mode of treatment, medication adherence and microvascular complications. The principal outcome variable for the present analysis was depression.

Data were collected using a pre-designed, pre-tested, semi-structured schedule, the Modified B. G. Prasad Scale 2024, the Hamilton Depression Rating Scale, existing medical and laboratory records, a weighing machine and a non-stretchable measuring tape. The schedule was prepared according to the study objectives and reviewed by three experts from the Department of Community Medicine, Calcutta National Medical College and Hospital, and modified accordingly. The original English schedule was translated into Bengali and Hindi with expert assistance and then back-translated into English. The translated versions were compared with the original and discrepancies were corrected. Pre-testing was performed among a small group of patients with type 2 diabetes attending the diabetic clinic; these individuals were not included in the final study sample. The schedule was then finalized.

Depressive symptoms were assessed using the Hamilton Depression Rating Scale. Clinical information was obtained through participant interviews, while existing medical and laboratory records were reviewed for disease-related information. Glycaemic status was determined from the participants' most recent fasting blood sugar, postprandial blood sugar and glycated haemoglobin reports. Good glycaemic control was defined as glycated haemoglobin below 7%, whereas poor glycaemic control was defined as glycated haemoglobin of 7% or above. Body mass index was calculated from measured height and weight. All study-related documents were kept anonymous and under the supervision of the principal investigator.

Data were entered into Microsoft Excel and analysed using Jamovi version 2.5.6. Descriptive statistics were expressed as frequencies and percentages for categorical variables and as mean and standard deviation for continuous variables. Associations between depression and socio-demographic, behavioural, anthropometric and clinical variables, including duration of diabetes, comorbidities and glycaemic control, were assessed using the chi-square test wherever appropriate. Odds ratios with 95% confidence intervals were calculated along with p-values. Finally, multinomial logistic regression analysis was performed to evaluate the relationship between depression and relevant explanatory variables. A p-value of less than 0.05 was considered statistically significant.

Ethical approval was obtained from the Institutional Ethics Committee of Calcutta National Medical College and Hospital, followed by submission and acceptance through the West Bengal University of Health Sciences. Participants were informed about the study purpose in their mother tongue and assured that the information provided would remain confidential and anonymous. Written informed consent was obtained from all participants. The collected data were preserved for at least three years.

RESULTS

A total of 178 patients with type 2 diabetes mellitus attending the diabetic clinic were included in the study. The mean age of the study participants was 43.5 ± 8.58 years. Among the participants, 111 (62.4%) were male and 67 (37.6%) were female. The majority of participants were urban residents (70.8%), belonged to nuclear families (68.0%), and had a sedentary lifestyle (78.1%). Comorbidities were present in 129 (72.5%) participants. Most participants (84.8%) had been diagnosed with type 2 diabetes mellitus for ≤10 years. Good glycaemic control, defined as HbA1c <7%, was observed in 111 (62.4%) participants, whereas 67 (37.6%) had poor glycaemic control (HbA1c ≥7%).

Table 1: Sociodemographic and clinical characteristics of the study participants (n=178)

Characteristic	Category	n	%
Age group	<45 years	97	54.5
	≥45 years	81	45.5
Gender	Male	111	62.4
	Female	67	37.6
Residence	Urban	126	70.8
	Rural	52	29.2
Religion	Hindu	92	51.7
	Muslim	86	48.3
Family type	Nuclear	121	68.0
	Joint	57	32.0
Physical activity	Sedentary	139	78.1
	Not sedentary	39	21.9
Comorbidities	Present	129	72.5
	Absent	49	27.5
Duration of T2DM	≤10 years	151	84.8
	>10 years	27	15.2
Glycaemic control	Good (HbA1c <7%)	111	62.4
	Poor (HbA1c ≥7%)	67	37.6

T2DM: type 2 diabetes mellitus; HbA1c: glycated haemoglobin.

Prevalence and severity of depression: Depressive symptoms were present in 63 of the 178 study participants, giving an overall occurrence of depression of 35.4%. Mild depressive symptoms were observed in 48 (27.0%) participants, while moderate depressive symptoms were present in 15 (8.4%). No participant was categorized as having severe depression.

Table 2: Distribution of study participants according to depression severity (n=178)

Depression status	n	%
No depression	115	64.6
Mild depression	48	27.0
Moderate depression	15	8.4
Total	178	100.0

Overall, 35.4% of the participants had depressive symptoms, with mild depression accounting for the majority of affected participants.

Association between sociodemographic characteristics and depression: The occurrence of depression was compared across different sociodemographic characteristics. There was no statistically significant association between age group and depression (χ^2=1.86, p=0.173). Depression was observed in 30.9% of participants aged <45 years and 40.7% of those aged ≥45 years. A statistically significant association was observed between gender and depression (p<0.001). Depressive symptoms were present in 45.0% of male participants compared with 19.4% of female participants.

Residence was also significantly associated with depression (χ^2=8.78, p=0.003). The occurrence of depression was higher among rural participants (51.9%) than among urban participants (28.6%). Religion showed a statistically significant association with depression (χ^2=4.08, p=0.043), with depressive symptoms reported in 42.4% of Hindu participants and 27.9% of Muslim participants. No statistically significant association was observed between family type and depression (p=0.199).

Table 3: Association between sociodemographic characteristics and depression (n=178)

Variable	Category	Depression, n (%)	No depression, n (%)	χ^2	p-value
Age group	<45 years	30 (30.9)	67 (69.1)	1.86	0.173
	≥45 years	33 (40.7)	48 (59.3)		
Gender	Male	50 (45.0)	61 (55.0)	12.00	**<0.001**
	Female	13 (19.4)	54 (80.6)		
Residence	Urban	36 (28.6)	90 (71.4)	8.78	**0.003**
	Rural	27 (51.9)	25 (48.1)		
Religion	Hindu	39 (42.4)	53 (57.6)	4.08	**0.043**
	Muslim	24 (27.9)	62 (72.1)		
Family type	Nuclear	39 (32.2)	82 (67.8)	1.65	0.199
	Joint	24 (42.1)	33 (57.9)		

χ^2: chi-square test.

Association between clinical characteristics, glycaemic control and depression: The relationship between selected clinical characteristics and depression was subsequently assessed. Depression was significantly associated with the presence of comorbidities. Among participants with one or more comorbidities, 44.2% had depressive symptoms compared with 12.2% among those without comorbidities (p=0.039).

Duration of diabetes was also significantly associated with depression (χ^2=6.69, p=0.027). Depressive symptoms were observed in 70.3% of participants with diabetes duration >10 years compared with 29.1% among those with diabetes duration ≤10 years. A significant association was observed between glycaemic control and depression. Among participants with poor glycaemic control (HbA1c ≥7%), 61.2% had depressive symptoms, compared with 19.8% among those with good glycaemic control (HbA1c <7%) (p=0.047).

In contrast, physical activity status was not significantly associated with depression (χ^2=2.53, p=0.112).

Table 4: Association between clinical characteristics and glycaemic control with depression (n=178)

Variable	Category	Depression, n (%)	No depression, n (%)	χ^2	p-value
Physical activity	Sedentary	45 (32.4)	94 (67.6)	2.53	0.112
	Not sedentary	18 (46.2)	21 (53.8)		
Comorbidities	Present	57 (44.2)	72 (55.8)	8.74	**0.039**
	Absent	6 (12.2)	43 (87.8)		
Duration of T2DM	≤10 years	44 (29.1)	107 (70.9)	6.69	**0.027**
	>10 years	19 (70.3)	8 (29.7)		
Glycaemic control	Good (HbA1c <7%)	22 (19.8)	89 (80.2)	9.41	**0.047**
	Poor (HbA1c ≥7%)	41 (61.2)	26 (38.8)		

T2DM: type 2 diabetes mellitus; HbA1c: glycated haemoglobin.

Multivariable analysis of factors associated with depression: Variables evaluated in the study were further examined using multinomial logistic regression to identify factors independently associated with depression. After adjustment, male gender, longer duration of diabetes and poor glycaemic control remained significantly associated with depression.

Male participants had 2.227 times higher adjusted odds of depression compared with female participants (AOR 2.227, 95% CI 1.593–3.297; p=0.030). Participants with diabetes duration >10 years had significantly higher adjusted odds of depression compared with those with diabetes duration ≤10 years (AOR 4.870, 95% CI 3.167–9.621; p=0.003).

The strongest association was observed for glycaemic control. Participants with poor glycaemic control had 9.137 times higher adjusted odds of depression compared with those with good glycaemic control (AOR 9.137, 95% CI 5.663–17.528; p<0.001).

Residence, religion and presence of comorbidities were not statistically significant in the adjusted model.

Table 5: Multivariable logistic regression analysis of factors associated with depression (n=178)

Variable	Reference category	Comparison	AOR	95% CI	p-value
Gender	Female	Male	2.227	1.593–3.297	**0.030**
Residence	Urban	Rural	0.870	0.285–1.395	0.708
Religion	Hindu	Muslim	0.693	0.438–1.462	0.417
Comorbidities	Absent	Present	1.037	0.784–1.485	0.443
Duration of T2DM	≤10 years	>10 years	4.870	3.167–9.621	**0.003**
Glycaemic control	Good	Poor	9.137	5.663–17.528	**<0.001**

AOR: adjusted odds ratio; CI: confidence interval; T2DM: type 2 diabetes mellitus.

In this hospital-based cross-sectional study of 178 patients with type 2 diabetes mellitus, depressive symptoms were present in 35.4% of participants. Most affected participants had mild depressive symptoms. On bivariate analysis, depression was significantly associated with gender, residence, religion, presence of comorbidities, duration of diabetes and glycaemic control. Depression was particularly frequent among participants with diabetes duration >10 years and among those with poor glycaemic control.

After adjustment for potential confounding variables, male gender, diabetes duration >10 years and poor glycaemic control remained significantly associated with depression. Poor glycaemic control demonstrated the strongest adjusted association, with participants having HbA1c ≥7% showing 9.137-fold higher adjusted odds of depression compared with those having HbA1c <7%.

DISCUSSION

The present study highlights the substantial psychological burden of depression among patients with type 2 diabetes mellitus (T2DM). Depression was identified in 35.4% of the study participants, with 27.0% having mild depression and 8.4% having moderate depression. This finding is comparable with previous studies reporting a high prevalence of depressive symptoms among patients with T2DM. Das et al. reported depressive symptoms in 38.2% of patients with T2DM, which is broadly similar to the prevalence observed in the present study.[17] The coexistence of depression and diabetes is clinically important because the two conditions may adversely influence each other, with depression potentially interfering with diabetes self-management and poor metabolic control contributing to psychological distress.[22,23]

The mean age of participants in the present study was 43.5 years, with the largest proportion belonging to the 41–50-year age group. This predominance of middle-aged individuals is consistent with observations from other studies. Lunghi et al. reported a similar age range, with a substantial proportion of their participants being in the 45–50-year group.[21] Das et al., however, reported a higher mean age of 53.7 years among T2DM patients with depression.[17] Knol et al. also observed that depressive symptoms may become more frequent with increasing age among individuals with T2DM.[19] Differences in age distribution between studies may reflect differences in the characteristics of the diabetic populations studied and the healthcare settings from which participants were recruited.

Gender was significantly associated with depression in the present study, with a higher proportion of depressive symptoms reported among women. Previous studies have similarly demonstrated greater psychological vulnerability among women with T2DM. Das et al. reported a higher incidence of depression among female patients, with women accounting for 60.7% of those with depressive symptoms.[17] Golden et al. described a bidirectional relationship between diabetes and depression and noted the greater vulnerability of women to depressive symptoms.[20] Soriguer et al. also reported a higher prevalence of depression among women, particularly among those with longer-standing T2DM.[18] These observations indicate that gender-related psychosocial and social factors may be relevant when assessing depression among patients with diabetes.

Residence was another factor associated with depression in the present study. Rural participants had a higher proportion of depressive symptoms than urban participants. This finding may partly reflect

differences in access to healthcare, availability of psychological services and socioeconomic circumstances. Kant et al. reported that rural populations may face greater barriers to healthcare access, which can adversely affect both diabetes management and mental health.[14] Johnson et al. also examined the relationship between urbanization, common mental disorders and diabetes, highlighting the complex interaction between social environment and metabolic health.[15] However, the association between residence and depression should be interpreted cautiously because multiple socioeconomic and healthcare-related factors may contribute to this relationship.

Religion was also associated with depression in the present study. Previous literature suggests that religious beliefs and coping mechanisms may influence psychological well-being among individuals with chronic illnesses. de Groot et al. reported an association between religious coping and lower levels of depression in patients with chronic disease.[22] At the same time, Schram et al. suggested that cultural attitudes towards illness and mental health may influence recognition and reporting of depressive symptoms.[24] The observed association in the present study may therefore reflect broader cultural, social or socioeconomic influences rather than an effect of religion itself.

Educational and socioeconomic characteristics are also relevant to the psychological health of patients with diabetes. A considerable proportion of the participants had high-school education or less, while a substantial proportion belonged to the lower socioeconomic class. Previous studies have linked lower educational attainment with poorer diabetes management and greater psychological morbidity. Alonso-Morán et al. reported poorer mental health outcomes among patients with lower educational levels, while Hervás et al. observed that higher educational attainment was associated with better access to information and improved diabetes management.[27,28] Socioeconomic disadvantage may similarly increase psychological stress through financial constraints, limited access to healthcare and difficulties in maintaining long-term diabetes care.[27]

Lifestyle-related factors may also influence the psychological health of patients with T2DM. In the present study, a large majority of participants followed a non-vegetarian diet, while smoking and alcohol consumption were also relatively common. Previous studies have described associations between lifestyle behaviours, metabolic control and depressive symptoms. Jiménez-García et al. reported that dietary patterns were related to psychological well-being among patients with T2DM, while Nicolau et al. highlighted the association between healthier dietary patterns and lower depression scores.[25,26] Smoking and alcohol consumption may further complicate diabetes management. Knol et al. described an association between smoking and depression, while de Groot et al. reported relationships between alcohol use, diabetes control and depression.[19,22] These findings emphasize the importance of considering lifestyle factors when addressing psychological morbidity in diabetes.

Duration of T2DM was an important diabetes-related factor in the present study. Participants with a longer duration of diabetes had a greater occurrence of depression. This finding is consistent with previous observations that psychological morbidity may increase as patients live longer with a chronic disease requiring continuous treatment and self-management. Golden et al. reported that longer duration of diabetes was associated with a greater risk of depression.20 Schram et al. similarly demonstrated an association between longer diabetes duration, poorer diabetes control and psychological problems.[24] Lustman and Clouse also emphasized the close relationship between chronic diabetes, complications and depression.[23] In the present study, the association remained important after adjustment, with patients having diabetes for more than 10 years showing higher odds of depression.

Glycaemic control demonstrated one of the most important associations with depression in the present study. Although 62.4% of participants had good glycaemic control, 37.6% had poor glycaemic control. Depression was substantially more frequent among participants with poor glycaemic control. This observation is consistent with previous studies. Lin et al. reported that poor glycaemic control was associated with greater depressive symptoms among patients with T2DM.[29] Schram et al. also found an association between higher HbA1c levels and depressive symptoms, while Lunghi et al. identified poor glycaemic control as an important predictor of depression.[24,21]

The relationship between depression and glycaemic control is likely to be complex. Depression may adversely affect medication adherence, dietary practices, motivation for physical activity and regular follow-up, thereby making diabetes management more difficult. Conversely, persistent hyperglycaemia, treatment burden and diabetes-related complications may contribute to psychological distress. Lustman and Clouse described this interaction as an important component of the relationship between diabetes and depression.[23] The present study therefore supports the need to consider psychological well-being alongside conventional metabolic measures in patients with T2DM. However, because this was a cross-sectional study, the direction of this relationship cannot be established, and the findings should be interpreted as an association rather than evidence of causality.

Medication adherence is another potentially important link between depression and glycaemic control. In the present study, 45.8% of participants demonstrated inconsistent medication adherence. Previous studies have shown that poor adherence can contribute to inadequate glycaemic control and increased diabetes-related complications. Mocan et al. reported poor medication adherence as an

important contributor to poor diabetes control, while Tattersall et al. associated non-adherence with adverse clinical outcomes.[30,31] Conversely, Mier et al. suggested that psychological factors, including depression, may themselves negatively affect adherence.[32] Thus, depression and adherence may form an interrelated cycle that complicates long-term diabetes management.

Overall, the present study demonstrates that depression is common among patients with T2DM and is associated with several demographic and clinical characteristics, particularly gender, residence, comorbidities, duration of diabetes and glycaemic control. The higher occurrence of depression among patients with longer disease duration and poor glycaemic control is particularly relevant for routine diabetic care. Similar findings reported across different populations further support the importance of recognizing depression as an integral component of diabetes management.[17,20,23,24]

The findings also have practical implications. Screening for depressive symptoms in diabetic clinics may help identify patients who require additional psychological assessment and support, particularly those with prolonged disease duration, poor glycaemic control or multiple comorbidities. An integrated approach addressing both metabolic and psychological aspects of T2DM may facilitate better adherence, self-management and overall patient well-being. Nevertheless, the tertiary-care setting and cross-sectional design limit generalizability and prevent conclusions regarding temporal or causal relationships. Further prospective studies involving larger and more diverse populations are required to clarify the direction and mechanisms of the association between depression and glycaemic control.

CONCLUSION

The present study demonstrates that depressive symptoms are common among patients with type 2 diabetes mellitus, with 35.4% of the study population showing depression. Most affected participants had mild depression, while a smaller proportion had moderate depression. Depression was significantly associated with several demographic and clinical characteristics, including gender, residence, religion, presence of comorbidities, duration of diabetes and glycaemic control.

A particularly important finding was the strong association between depression and poor glycaemic control. Patients with poor glycaemic control had a substantially higher occurrence of depressive symptoms, and poor glycaemic control remained strongly associated with depression after adjustment for other factors. Longer duration of type 2 diabetes was also independently associated with depression, suggesting that psychological morbidity may become increasingly relevant with prolonged disease burden.

These findings emphasize that diabetes care should extend beyond assessment of metabolic parameters alone. Routine recognition and screening of depressive symptoms, particularly among patients with prolonged diabetes duration, poor glycaemic control and coexisting illnesses, may facilitate early identification of psychological difficulties and appropriate support. However, as this was a cross-sectional study, the temporal and causal relationship between depression and glycaemic control cannot be established. Further prospective studies are required to clarify this relationship and to evaluate whether integrated psychological and metabolic care can improve long-term outcomes in patients with type 2 diabetes mellitus.

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